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2 1. A method for the elimination of one or more redundant tests and the
3 reordering of one or more inefficient tests in digital integrated circuits
4 (IC's), further comprising:
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6 for each test of a sequence of N tests, compiling L common
7 defective dice, wherein said N tests comprise one or more
8 redundant tests and one or more inefficient tests;
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10 representing each test of the sequence of N tests as a
11 correlation vector such that the sequence of N tests is
12 represented as N correlation vectors;
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14 finding a first correlation vector of the N correlation vectors that
15 has the most non-zero components and initialize a vector W to
16 be the complement of the first correlation vector;
17
18 for each correlation vector of the remaining N-1 correlation
19 vectors, calculating a product of the complement of each
20 correlation vector and the vector W;
21
22 calculating a length of a projection of each calculated product
23 vector onto a unit vector;
24
25 finding the correlation vector of the N-1 correlation vectors that
26 has a smallest value of the projection length;
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28 updating the vector W to be a product of vector W and a
29 compliment of the determined correlation vector in the previous

- 1 step; and
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- 3 repeating the previous four elements, until the length of the
- 4 projection of vector W onto the unit vector is zero.
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- 6 2. The method of claim 1, wherein the correlation vector that has the smallest
- 7 value of the projection length is stored as one of the correlation vectors in
- 8 an optimized set.
- 9
- 10 3. The method of claim 1, wherein each correlation vector is represented
- 11 using a binary-valued L-dimensional vector.
- 12
- 13 4. The method of claim 1, wherein a multiplication of two vectors is defined to
- 14 be a vector which components are calculated from the logical AND
- 15 operation of the corresponding components of the two vectors.
- 16
- 17 5. The method of claim 1, wherein the execution time of each test is the
- 18 same.
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- 20 6. The method of claim 1, wherein prior to compiling the N tests, executing
- 21 the sequence of N tests without stopping at a failing test.
- 22
- 23 7. The method of claim 1, further comprising analyzing the correlation among
- 24 the N tests by representing each test of the n tests in a L-dimensional
- 25 defective die space using a binary-valued L-dimensional vector.
- 26
- 27 8. The method of claim 2, wherein finding a vector in the optimized set of
- 28 vectors further comprises determining the vector of the remaining vectors
- 29 with a smallest value of the square of the length of the projection of vector

1 W onto the unit vector.

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3 9. The method of claim 1, wherein finding a vector of the optimized set
4 further comprises all remaining vectors of the N correlation vectors with
5 zero projection onto vector W representing zero defects.

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7 10. The method of claim 1, further comprising obtaining the optimized set by
8 sorting the lengths of the N projection vectors in a descending order.

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10 11. A method for the reordering of one or more inefficient tests in digital
11 integrated circuits (IC's) when the execution time of each test is the same,
12 further comprising:

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14 for each test of a sequence of N tests, compiling L common
15 defective dice;

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17 representing each test of the sequence of N tests as a
18 correlation vector using a binary-valued L-dimensional vector;

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20 finding a first correlation vector of the N correlation vectors that
21 has the most non-zero components and initialize a vector W to
22 be the complement of this first correlation vector;

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24 defining a multiplication of two correlation vectors to be a vector
25 with components calculated from the logical AND operation of
26 the corresponding components of the two correlation vectors;

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28 for each correlation vector of the remaining correlation vectors,
29 calculating a product vector of the complement of each

10010958-1

- 1 correlation vector and vector W using the multiplication definition
- 2 in the previous element;
- 3
- 4 calculating a projection length of each product vector onto the
- 5 unit vector;
- 6
- 7 finding the correlation vector that has the smallest value of the
- 8 projection length;
- 9
- 10 storing this correlation vector as one of the correlation vectors in
- 11 an optimized sequence;
- 12
- 13 updating vector W to be the product of vector W and a
- 14 compliment of the correlation vector in the previous step;
- 15
- 16 repeating the previous five elements, until the length of the
- 17 projection of vector W onto the unit vector is zero; and
- 18
- 19 assigning the vector W to be the unit vector and repeating the
- 20 previous six elements until there are no remaining vectors.
- 21
- 22 12. A method for the elimination of one or more redundant tests and the
- 23 reordering of one or more inefficient tests in digital integrated circuits (IC's)
- 24 when the execution time of each test is different, further comprising:
- 25
- 26 for each test of a sequence of N tests, compiling L common
- 27 defective dice and storing the execution time of the sequence of
- 28 N tests;
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10010958-1

- 1 representing each test of the sequence N tests as a correlation
- 2 vector using a binary-valued L-dimensional vector;
- 3
- 4 finding a first correlation vector of the N correlation vectors that
- 5 has the largest value of the number of non-zero components
- 6 divided by the execution time of the corresponding test and then
- 7 initialize vector W to be a complement of this vector;
- 8
- 9 defining the multiplication of two correlation vectors to be a
- 10 vector with components that are calculated from the logical AND
- 11 operation of the corresponding components of the two
- 12 correlation vectors;
- 13
- 14 for each correlation vector of the remaining correlation vectors,
- 15 calculating a length of a projection of the correlation vector onto
- 16 vector W;
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- 18 calculating a quotient of the calculated projection length in the
- 19 previous step and the execution time of the corresponding test;
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- 21 finding the correlation vector that has the largest value of the
- 22 quotient calculated in the previous step;
- 23
- 24 storing this correlation vector as one of the correlation vectors in
- 25 an optimized sequence;
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- 27 updating vector W to be the product of vector W and the
- 28 compliment of the stored correlation vector in the previous step;
- 29 and

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repeating the previous five elements, until the length of the projection of vector W onto the unit vector is zero.

13. A method for the reordering of one or more inefficient tests in digital integrated circuits (IC's) when the execution time of each test is different, further comprising:

for each test of a sequence of N tests, compiling L common defective dice and storing the execution time of the sequence of N tests;

representing each test of the sequence of N tests as a correlation vector using a binary-valued L -dimensional vector;

finding a first correlation vector of the N correlation vectors that has the largest value of the number of non-zero components divided by the execution time of the corresponding test and then initialize a vector W to be a complement of this vector;

defining a multiplication of two correlation vectors to be a vector with components that are calculated from the logical AND operation of the corresponding components of the two correlation vectors;

for each correlation vector of the remaining correlation vectors, calculating a length of a projection of the correlation vector onto vector W ;

10010958-1

- 1 calculating a quotient of the calculated projection length in the
- 2 previous step and the execution time of the corresponding test;
- 3
- 4 finding a correlation vector that has the largest value of the
- 5 quotient calculated in the previous step;
- 6
- 7 storing this correlation vector as one of the correlation vectors in
- 8 an optimized sequence;
- 9
- 10 updating vector W to be the product of vector W and a
- 11 compliment of the stored correlation vector in the previous step;
- 12
- 13 repeating the previous five elements, until the length of the
- 14 projection of vector W onto a unit vector is zero; and
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- 16 assigning vector W to be the unit vector and repeating the
- 17 previous six elements until there are no remaining vectors.
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